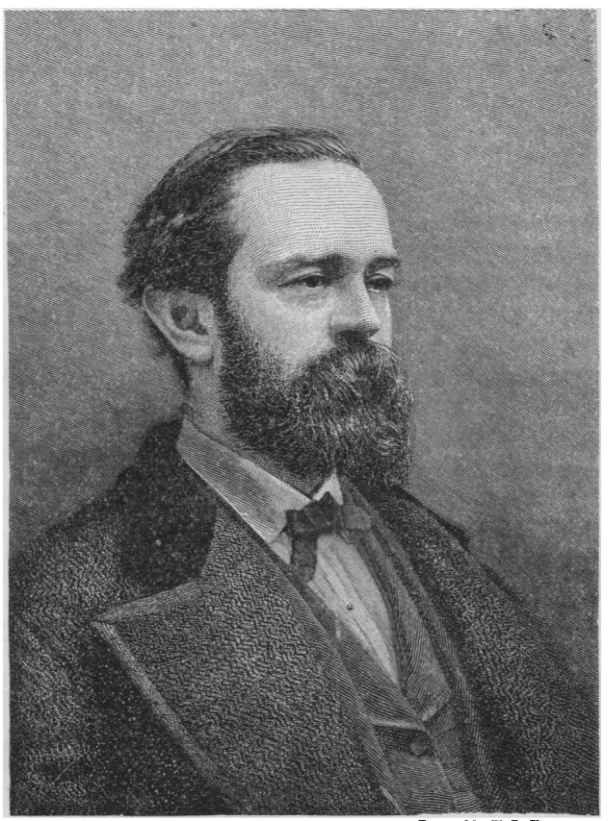
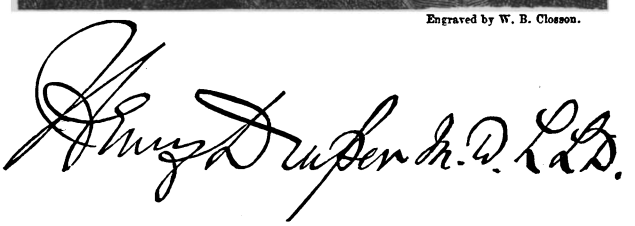
FRIDAY, FEBRUARY 16, 1883.

THE LATE DR. HENRY DRAPER.

DURING the past year, the National academy of sciences has lost by death seven out of its membership of less than one hundred, — Professor John W. Draper (the father of the subject of this notice), Admiral John Rodgers, Professor William B. Rogers, Hon. George P. Marsh, Gen. J. G. Barnard, Gen. G. K. Warren, and last, and saddest of all, Dr. Henry Draper.



Engraved by W. B. Closson.



The five first named were men advanced in years, whose work was substantially complete and finished, so that they had come to the natural end of honorable lives. Gen. Warren also had passed the age of fifty, and for some years had ceased to take any active part in scientific enterprise.

Dr. Henry Draper alone of all the seven was one from whom more even was to be expected in the future than the work he had already accomplished. He was cut off in the midst of his most successful achievements, at the very culmination of his course, just in the fulness of his strength. It is the simple truth, — what another has said already, — that "no greater calamity could have befallen American science than the recent and sudden death of Professor Henry Draper;" because he was now prepared by long experience, by the enthusiasm and confidence born of past success, by ripened judgment, and accumulated resources, for swifter advance than ever before in the important branch of research which he had made his own.

Only four days before he died, he entertained at his house a company of his scientific *confrères*, with a few other chosen friends. No one then present will ever forget the splendor and beauty of the scene, nor the genial hospitality of the host and his accomplished wife. Few of us ever heard his voice again. He was already suffering from a severe cold contracted by exposure in a storm during a hunting excursion among the Rocky Mountains (he had returned only a few days before), and the labor of preparing for this reception of his friends probably aggravated the trouble. That very night the hand of death was laid upon him, and after three days of suffering and struggle he was snatched away.

He was born in 1837, in Virginia; the second son of John William Draper, then at the

beginning of his brilliant career. The father was at the time a young professor of chemistry in Hampden-Sydney college; he had come to this country from England a few years before, to take a professorship at Boydton, Va., having been induced to come to the United States, partly by the solicitations of his Virginian relatives, and partly by considerations connected with his romantic marriage to a young Portuguese lady of noble birth. In 1839 the elder Draper accepted the chair of chemistry in the New-York university, and removed to the city with his family. Henry Draper, therefore, though by birth a Virginian, and mingling in his veins the blood of both the Anglo-Saxon and the Latin races, was yet entirely a New-Yorker in all his early associations and education, as well as in his later life.

He was educated in the schools of the city, and in the university with which his father was connected. He entered the freshman class at the age of fifteen, and went through the first two years of the college course. His instructors remember him as a bright, active youth, full of spirits, but with a strong taste and bent for scientific pursuits. At the beginning of his junior year he left the college for the medical school, and in 1858 he took his degree of M.D. with distinguished honor.

His education was conducted throughout under the immediate and loving supervision of his father, from whom he inherited such qualities of mind and temperament as qualified him pre-eminently for the work he was to do. A writer in 'Harper's weekly,' speaking of this, says, —

"He had for a companion, friend, and teacher from childhood, one of the most thoroughly cultivated and original scientific men of the present age, who attended carefully to his instruction, and impressed upon him deeply the bent of his own mind in the direction of science. The boy was, in fact, immersed in science from his youngest years; and not merely crammed with its results, but saturated with its true spirit at the most impressible period; he was taught to love science for the interest of its inquiries, and was early put upon the line of investigation in which he has won his celebrity. He inherited not only his father's genius, but his problems of research.

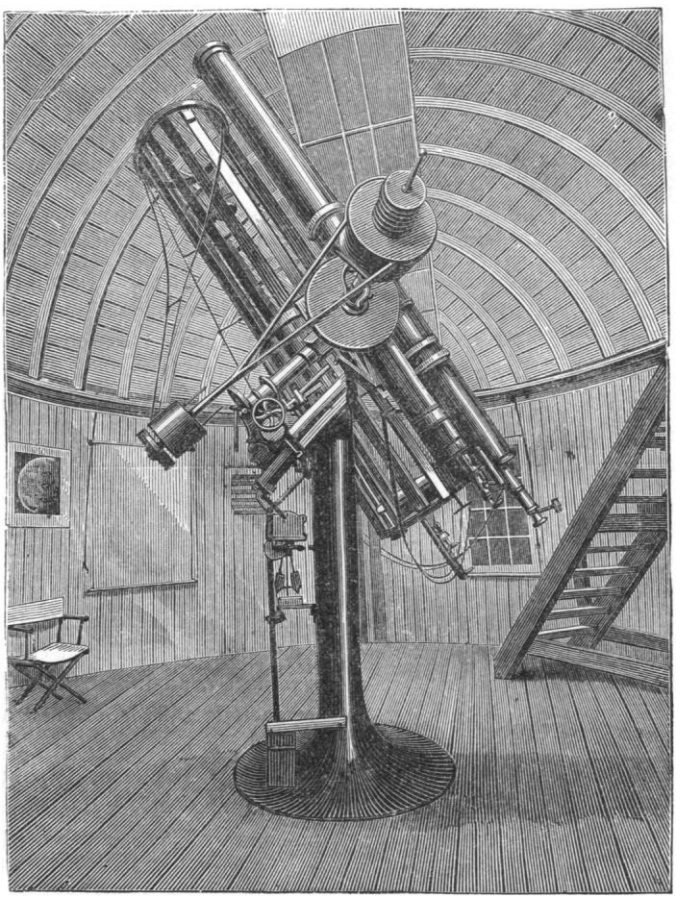
"Dr. John W. Draper was an experimental investigator of such fertility of resource, and such consummate skill, that the European *savants* always deplored his proclivity to literary labors, as a great loss to the scientific world. Henry Draper inherited from his father in an eminent degree the aptitude for delicate experimenting, and a fine capacity of manipulatory tact."

Nothing could be more beautiful than the relation and intercourse between this father and son in later years: on one side was the sincerest filial devotion, respect, and admiration; on the other, paternal pride and confidence; on both sides, the warmest affection, and perfect sympathy of purpose and idea.

Dr. Henry Draper began his researches before he left the college walls. His graduating thesis was a really valuable investigation of the functions of the spleen, and was conducted by means of microphotography, an art then only newly born. In the course of this work he discovered the great value of palladium protochloride in the darkening of collodion negatives. The year after his graduation was spent in Europe; and there, while he did not fail to appreciate and enjoy all that is interesting to every man of culture, still he was most interested in the places, methods, and instruments of scientific research. His visit to the great six-foot reflecting telescope of Lord Rosse, by far the largest ever constructed, gave to his ambition a stimulus and direction which influenced his whole life, and largely determined his career.

On his return he received an appointment in Bellevue Hospital, which he retained for sixteen months, with the intention of practising medicine. In 1860, however, he abandoned this purpose; and by accepting the chair of physiology in the academic department of the university, he definitely adopted the profession of an instructor. During the civil war his work was for a time interrupted by a short term of service in 1862 as surgeon of the twelfth regiment of New-York volunteers; but a military career had few attractions for him, and as soon as he was no longer needed he returned to the duties of his chair. In 1866 he was appointed to the professorship of physiol-

ogy in the medical school. He retained this post until 1873, when he resigned it, but continued to give the instruction in analytical chemistry in the academic department. At his father's death he was appointed to fill the vacant chair, and accepted the position; but only a few months before his death he resigned, and finally severed his connection with the university in order to give himself more entirely to research. At the time when he accepted the chair of physiology in the medical school, and became its manager, the institution had just lost its building by fire, with all its valuable collections. The young director immediately replaced them, largely by funds furnished by himself, and partly by assistance secured from others through his indomitable energy and skilful tact. The school, which seemed to be destroyed, was rehabilitated, and brought to its present state of flourishing prosperity.



THE TELESCOPES IN THE HASTINGS OBSERVATORY.

His resignation in 1873 was necessitated by the heavy labor and responsibility imposed upon him as managing trustee of the immense estate of his father-in-law, the late Courtlandt Palmer, whose daughter he had married in 1867.

As a lecturer and instructor he was eminently successful. Says a writer in the University quarterly (the 'college magazine' of the New-York university), —

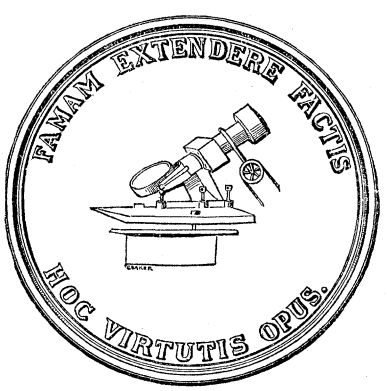
"His lectures are so interesting and absorbing to his hearers, that the question of order, which in some recitation-rooms assumes large proportions, is hardly even thought of with him. After class, an eager group surrounds him; and every tap by inquiring students is followed by a rich stream of information from a mind whose varied treasures always lie at instant command."

But he was still more eminent and successful as an investigator. We have already mentioned his first essay of the sort, and it was soon followed by others more extensive. Immediately upon his return from Europe he began the construction of a fifteen-and-a-half inch reflecting telescope, and carried the work to a satisfactory conclusion. With it he took a photograph of the moon, fifty inches in diameter, the largest ever made, and one of the finest.

Encouraged by this success he aimed still higher, and built another reflector of twenty-eight inches aperture, which was completed in 1872. This, with its equatorial mounting and perfect driving clock, was wholly the work

of his own hands. It was intended and used successfully for the purpose of photographing the spectra of stars. As President Barnard has said, "it was probably the most difficult and costly experiment in celestial chemistry ever made." It was with this instrument

that in August, 1872, he first succeeded in obtaining a photograph of a star-spectrum, showing its characteristic lines: the star was Vega, and the lines were those of hydrogen. Since then he has taken the spectra of more than a hundred stars, and at the time of his death was preparing to push the work much farther. Most of the later photographs were made with an exquisite refractor of eleven and a half inches aperture, by Clark & Sons.



This telescope, which he has found much more convenient than the reflectors, is provided with a special correcting lens for photographic work; and it was with this that he made those wonderful photographs of the nebula of Orion, which were the fruit of his long and weary labors during the two last winters. For the most part he was accustomed to carry on his astronomical work in the summer, while residing at his country-seat on the Hudson; in the winter he generally spent most of the time in the city, and gave himself mainly to laboratory research. In 1872, as a first step towards the interpretation of stellar spectra, he made a photograph of the diffraction spectrum of the sun, extending from below G to O. Others have since then taken pictures of small portions of the spectrum on a larger scale; but his photograph still remains classical and standard, and is recognized as such, abroad as well as here.

In 1874 he was invited by the Transit of Venus commission, to superintend its photographic department; and he did so with such success, that on the completion of his labors the United-States government caused a special gold medal to be struck in his honor at the Philadelphia mint. Upon the face it bears the inscription, "Decori decus addit avito;" on the reverse, "Famam extendere factis, hoc virtutis opus."

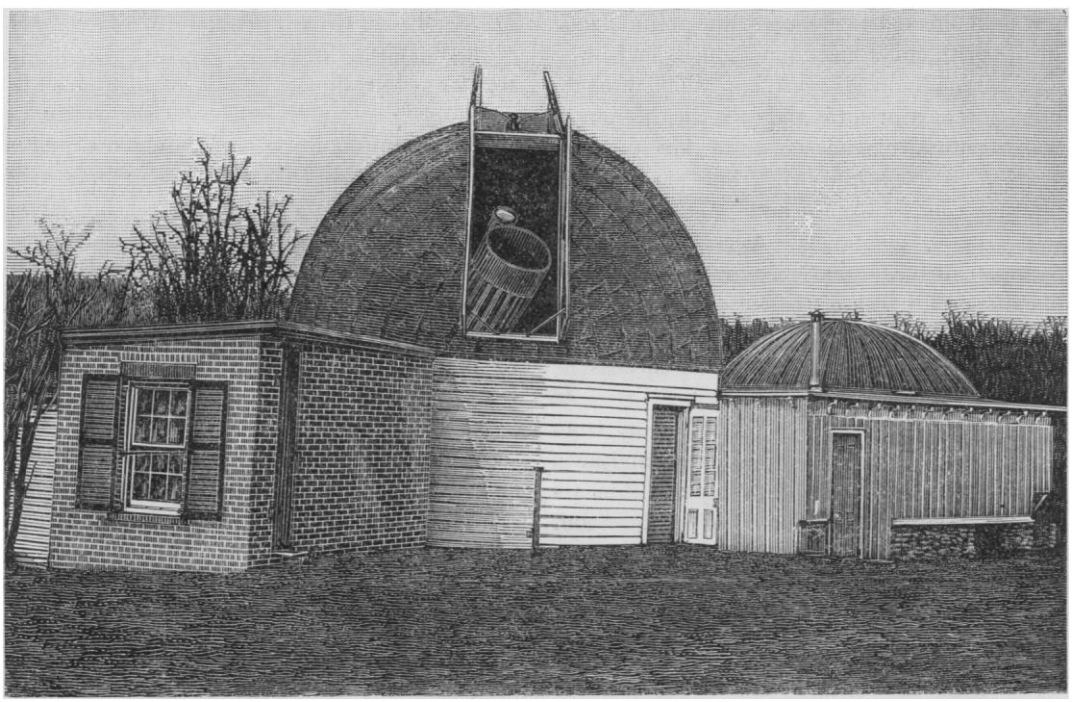
Next he took up his famous research as to the presence of the non-metals in the solar atmosphere, and in 1877 published his paper announcing the discovery of oxygen in the sun. The investigation was exceedingly protracted and laborious, and involved an expense of several thousand dollars: it was carried out by means of photography, several hundred plates having been made, which show the solar spectrum confronted with that of the gas. In these plates we find the diffuse, hazy, bright lines of the oxygen spectrum coinciding, not with *dark* lines of the solar spectrum, but with certain brighter bands or interspaces. How this can be, it is far from easy to explain, — why oxygen alone should act in this unprecedented way. Naturally there has been some scepticism and discussion as to the correctness and soundness of his conclusion; but no one with an unprejudiced mind can, we think, resist the evidence after careful examination of the plates, especially those obtained during his second, and still more

elaborate, investigation of the subject in 1878–79.

In the summer of 1878 Dr. Draper organized a party for the observation of the solar eclipse of July 29. His station was at Rawlins, Wyoming Territory; and he succeeded, as did many others, in getting a fine photograph of the corona: he also succeeded, as no one else did, in getting a photograph of its spectrum, which, however, at that time was almost simply continuous.

Smithsonian institution, is a work of great importance. In the different scientific journals of England and the United States, he has from time to time published numerous papers giving account of his different researches. Our space forbids a catalogue, but they are mostly enumerated in the obituary notice published in the January number of the Popular science monthly.

Considerable unpublished work remains behind. Among other things should specially be noted the ingenious contrivance by which



DR. DRAPER'S OBSERVATORY AT HASTINGS-ON-THE-HUDSON.

In 1881 he obtained photographs of the spectrum of the great comet of that year, and also of the nebula of Orion and its spectrum. These pictures of the nebula are among the most remarkable and interesting specimens of celestial photography in existence.

Dr. Draper was not a prolific writer; but every thing he wrote was valuable, — clear, logical, and effective. Early in his career he published an excellent text-book of chemistry; and his paper upon the construction of silvered-glass telescopes, published by the

he succeeded in compelling a prism of bisulphide of carbon to perform satisfactorily in spite of changing temperature; and the equally interesting invention for working the Edison incandescent lamp by means of a gas-engine, without the disagreeable fluctuation of light which usually accompanies the use of such an engine.

Dr. Draper was a member of the Century and Union league clubs, and occupied a high social position. With politics he did not meddle to any extent, though he was always

patriotic and interested in the public welfare. He was connected with numerous scientific bodies in the city and country, and with many abroad. Though one of the youngest members of the National academy of sciences, he was one of the most effective and influential. Last summer his *alma mater* and the University of Wisconsin honored themselves and him, by conferring upon him simultaneously, but independently, the degree of LL.D.

Excepting his early death, Dr. Draper was a man fortunate in all things: in his vigorous physique, his delicate senses, and skilful hand; in his birth and education; in his friendships; and especially in his marriage, which brought him not only wealth and all the happiness which naturally comes with a lovely, true-hearted, and faithful wife, but also a most unusual companionship and intellectual sympathy in all his favorite pursuits. He was fortunate in the great resources which lay at his disposal, and the wisdom to manage and use them well; in the subjects he chose for his researches, and the complete success he invariably attained.

In person he was of medium height, compactly built, with a pleasing address, and keen black eye which missed nothing within its range. He was affectionate, noble, just, and generous; a thorough gentleman, with a quick and burning contempt for all shams and meanness; a friend most kind, sympathetic, helpful, and brotherly; genial, wise, and witty in conversation; clear-headed, prudent, and active in business; a man of the highest and most refined intellectual tastes and qualities; a lover of art and music, and also of manly sports, especially the hunt; of such manual skill that no mechanic in the city could do finer work than he; in the pursuit of science, able, indefatigable, indomitable, sparing neither time, labor, nor expense.

His loss is lamented keenly, not only by those to whom it is a personal bereavement, but by every sincere lover of truth and science. It must be long before another can be found of such abilities, means, and versatility, to carry on his unfinished work.

But it is violating no confidence to add that his wife, who for fifteen years was his untiring assistant in all his labors, who knew all his plans, and thoroughly understood them too, now hopes and intends to find some way to have his work continued, to utilize the magnificent apparatus he had collected, and so to perpetuate his memory, and keep it forever green by providing for the accomplishment of his most cherished purposes: — Monumentum aere perennius. Charles A. Young.

THE WEATHER IN NOVEMBER, 1882.

The monthly weather review is one of the regular publications of the United-States signal-service. Twenty days after the close of a month is allowed for the receipt of reports, at the expiration of which the review is made up and printed. The November review is an improvement over any of its predecessors, in being stitched and furnished with a neat cover, which contains the name of co-operating observers and of vessels whose officers furnish marine reports, and also a list of meteorological instruments, with the prices at which they may be obtained through the signal-office. The following may be mentioned as the noteworthy meteorological conditions of the month: —

The barometric pressure was nearly normal when compared with the November pressure of previous years. The number of minima sufficiently well marked to allow the charting of their paths is only five, an unusually small number, the average in former years being fourteen. Three of these depressions pursued an easterly track over the northern portion of the country, and two a north-easterly along the Gulf and Atlantic coasts. The latter were the most severe storms of the month.

The temperature was below the normal along the eastern coast and from the Rocky Mountains to the Pacific. In other portions the temperature was higher than the average. Frosts were frequently reported in all districts, the least number being three in the South-Pacific region; while temperatures above 90° F. were reported from Arizona and Texas. The month witnessed the closing to navigation of the upper Missouri and Mississippi rivers and the upper lakes.

There was a marked deficiency in rainfall in nearly the whole country, the principal exception being the middle Pacific coast. New England suffered most from lack of rain; the rainfall, including melted snow, amounting to